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BLUE-GREEN ALGAE IN LAKES

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ALGAE BLOOMS

According to Connecticut's Department of Energy and Environmental Protection (DEEP), most algae blooms (dense surface scums from rapid growth) take place from midsummer to early fall and not all blooms are harmful. During an algae bloom, the water's surface may appear:

- cloudy or thick like pea soup
- green or brown in color
- to have a mat of algae, scum, or foam or as though someone spilled paint on the water.

DEEP's website provides information about potential health effects from exposure to certain blooms, such as from blue-green algae, and recommended precautions.

ISSUE

1) What causes blue-green algae to grow in Connecticut lakes?

2) What state programs and laws are in place to combat its growth?

3) What can municipalities and lake authorities do to prevent the algae growth?

4) What steps do other states take to combat its growth?

SUMMARY

Blue-green algae (also known as cyanobacteria) are microscopic organisms that naturally occur in Connecticut's lakes. It can grow rapidly, causing algae blooms, when, among other things, the amount of nutrients (e.g., phosphorus and nitrogen) in the water increase.

"Nonpoint source" pollution is a main cause of increased nutrient content in the state's lakes. Runoff from agriculture, lawns, and impervious surfaces flow into water bodies, carrying nutrients from chemicals, fertilizer, and pet waste. Faulty sewage systems also contribute to increased nutrient content in surface and ground water.

Connecticut has many programs and laws aimed at reducing nonpoint source pollution at the site and reducing the nutrient content in products that enter water bodies. The Department of Energy and Environmental Protection (DEEP) has

programs dedicated to addressing nonpoint source pollution and lake water quality. It regulates stormwater runoff through permits. State law also restricts phosphorus content in certain detergents and fertilizers. There is funding available for nonpoint source pollution reduction projects.

Efforts to decrease nutrient content and prevent algae blooms also occur at the municipal level and through entities such as lake authorities. Municipalities may adopt zoning regulations to restrict development near water bodies. Lake authorities often help educate the public about nutrient sources. It is also possible to use chemicals to directly reduce algae blooms.

The federal Environmental Protection Agency (EPA) works with states to reduce the discharge of nutrients ("nutrient loading"). Efforts individual states make to address nutrient pollution and reduce algae growth vary and a comprehensive summary of the ways the states address the issue is beyond the scope of this report. However, some examples include (1) establishing a specific algae control program, paid with dedicated funds; (2) various laws restricting fertilizer and detergent use; and (3) laws regulating development near water bodies (shoreland protection laws).

CAUSES OF ALGAE GROWTH

According to DEEP, blue-green algae is generally not noticeable, but can grow rapidly if there is abundant light, high water temperature, and increased nutrient content. Blue-green algae blooms can cause health problems because they may contain a mix of toxins, such as skin irritants and liver toxins.

In Connecticut, the main cause of increased nutrient content in lakes is nonpoint source pollution. This pollution does not come from a discrete source, such as an industrial or sewage discharge pipe. Rather, it results from activities that occur over a wide geographic area and are generally associated with precipitation and runoff from the land.

Potential nutrient sources, besides those occurring naturally, include agricultural and lawn runoff containing fertilizer; pesticides; and bacteria and nutrients from animal wastes and faulty septic systems. Stormwater and snow melt carry runoff from lawns and impervious surfaces, such as driveways and streets, to water bodies. Heavy rainfall may increase nutrient pollution from runoff.

CONNECTICUT PROGRAMS AND STATUTES

Connecticut has several programs and laws to reduce the amount of nutrients, particularly phosphorus, in its lakes. The efforts generally involve mechanisms to prevent nutrients from entering the waters.

Programs

Required by federal law, Connecticut's Water Quality Standards serve as the base for the state's water management programs (Conn. Agencies Reg. §§ 22a-426-1 to 22a-426-9). The standards provide (1) policies on water uses, (2) classifications of surface and groundwater resources, and (3) standards and criteria needed to support the uses.

DEEP protects water quality in the state's lakes through many regulatory and non-regulatory programs, such as its Nonpoint Source Pollution Management and Lake Water Quality Management programs. These programs work with other federal, state, and local programs to collectively address water quality concerns.

Nonpoint Source Pollution Management Program. DEEP's Nonpoint Source Pollution Management Program works to prevent threats to water quality by improving management practices. It implements a management plan, which provides a framework for activities to combat nonpoint source pollution over a five-year period. The program also administers grants to address nonpoint source impairments; they are awarded on a competitive basis.

Lake Water Quality Management Program. The Lake Water Quality Management Program seeks to prevent pollution, abate pollution sources, and implement lake restoration technologies. DEEP meets with property owners, lake associations, and municipal officials to promote and help with lake management projects.

According to the program's website, the components of lake water quality management are (1) monitoring, (2) study and assessment, and (3) establishing and implementing a plan to improve water quality. This includes implementing best management practices for nonpoint source pollution, such as improving lawn fertilization practices, catch basin cleaning, and installing stormwater treatment technology.

Nutrient Reduction-Related Laws

Coordinating Committee. By law, DEEP must work with officials from several municipalities to evaluate and recommend a statewide strategy for reducing phosphorus loading in inland nontidal waters. A primary focus of the group is to address phosphorus from wastewater treatment plant discharge, but the officials must also consider how to address phosphorus from nonpoint sources (CGS § 22a-428a).

Detergents. The law requires detergents to be clearly labeled with the amount of phosphorus they contain. It generally sets, at seven grams of phosphorus by weight, the maximum recommended use amount for certain detergents sold in the state. (It exempts from the limit detergents used in such things as machine dishwashers or food processing or dairy equipment.) The law also authorizes the DEEP commissioner to ban or restrict the sale or use of any detergent (CGS §§ 22a-460 et seq. and Conn. Agencies Reg. § 22a-462-2).

Lakes Grant Program. The Lakes Grant Program provides matching grants for lake restoration studies and projects at lakes with public access (CGS § 22a-339a). Funding comes from the State Bond Commission and varies according to project costs and available funding. The grants may be used to conduct diagnostic studies and develop and implement restoration projects such as algae control and infrastructure improvements. Municipalities, lake authorities, and lake associations that are taxing districts are those eligible for the grants (see below).

Phosphorus Fertilizer. The legislature restricted the use of fertilizer, soil amendments, or compost with phosphorus (over .67% phosphate) in 2012. The law generally bans applying these products (1) on established lawns and impervious surfaces, (2) during winter months, or (3) within certain distances of a water body. Agricultural or golf course applications are exempt (CGS § 22-111yy).

Stormwater Pollution. DEEP, authorized by EPA, issues permits to regulate stormwater discharge. One of the permits requires certain municipalities to take action to keep stormwater clean before it enters storm sewer systems and water bodies. This permit, known as the General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems (the "MS4 Permit"), requires municipalities to develop and implement stormwater management plans. More information about this permit is available on DEEP's Stormwater Management website.

MUNICIPAL AND LAKE AUTHORITY EFFORTS

By law, two or more municipalities with a body of state water within their territory may establish a lake authority. The authority acts as the municipalities' agent in certain lake matters (e.g., boating) and municipalities may also give the authority the power to (1) control and abate algae and aquatic weeds with DEEP, (2) study water management and recommend actions, and (3) apply for grants and receive gifts (CGS § 7-151a). Lake associations that are taxing districts may also receive grants to combat algae. These districts, which are formed by special act or a municipal vote, may be established to make appropriations, levy taxes, and perform lake management functions (CGS § 7-325).

Algae Advisories

State law gives municipalities the authority to control and operate recreational places, public beaches, and beach facilities, including regulating and prohibiting swimming or bathing in these areas (CGS § 7-148). DEEP and the Department of Public Health provide a guidance document for local health departments dealing with blue-green algae blooms. It includes recommendations for surveillance, characterization, and declaring or ending an algae bloom advisory.

Municipal Regulations

Municipalities may incorporate provisions in their zoning regulations to restrict certain development around water bodies. For example, Brookfield has a Watershed Protection District to prevent nutrient enrichment or contamination and to minimize the impact of stormwater runoff in Candlewood Lake and its watershed. The regulations require stormwater management plans for new construction or certain alterations. The plans must include best management practices to prevent or reduce risks to the lake, such as keeping natural vegetation, using vegetative buffers, or installing permeable surfaces or filtration systems.

Public Education

Municipalities and lake authorities take steps to educate the public, particularly property owners on or near lakes, about the steps they can take to reduce nutrient content in water bodies.

The Candlewood Lake Authority (CLA) provides a publication on its website describing these steps, focusing on four primary nutrient sources: (1) storm drains, (2) stormwater, (3) yard maintenance, and (4) septic systems.

Specifically, CLA encourages regular storm drain cleaning and warns against putting harmful items, such as chemicals, trash, grass clippings, and leaves, in storm drains. To decrease stormwater runoff flowing into the lake, it encourages installing rain barrels to catch roof runoff, building rain gardens to collect stormwater, creating vegetative buffers near the water, and reducing impervious surface areas.

CLA cautions against using pesticides or chemicals on vegetation and suggests using non-phosphorus fertilizer. It also cautions against mowing lawns too short and asks homeowners to pick up pet waste.

Lastly, CLA requests that homeowners (1) regularly pump their septic systems and have them inspected; (2) not dump chemicals, fats or greases, or other non-septic safe paper down toilets or sinks; and (3) use non-phosphorus laundry or dish detergent.

Direct Treatment

Physically addressing algae or chemically treating lakes to control blue-green algae is also possible. For example, in 2010 the Lake Lillinonah Authority contracted and paid for an application of copper sulfate to reduce algae in the lake. The application required a DEEP permit.

Descriptions of other methods to control and manage blue-green algae are available on EPA's website at http://www2.epa.gov/nutrient-policy-data/control-and-treatment. These methods include both prevention and mitigation measures.

ALGAE CONTROL EFFORTS IN OTHER STATES

Toxic algae blooms are a nationwide concern. EPA works with states to address sources of nutrient pollution, such as runoff, that compromise water quality and contribute to algae growth. State approaches to reducing nonpoint source pollution and addressing harmful algae blooms vary because of different states' needs and the issue's complexity.

EPA Recommendations for States

In 2011, EPA issued a memorandum reaffirming its commitment to reduce nitrogen and phosphorus loading in water bodies. The document emphasized the need for state-specific approaches and provided a list of recommended elements as components of nutrient reduction frameworks.

According to EPA's memorandum, states should prioritize watersheds on a statewide basis, set nutrient reduction goals for them based on available water quality information, and then reduce nutrients through strengthened permits and other reduction measures, such as land stewardship practices.

EPA's position is that states that want to have effective nutrient reduction programs must have numeric nutrient criteria designated for different categories of waterbodies. These criteria help (1) monitor water quality for different uses (e.g., recreation, navigation, potable water), (2) set reduction targets for discharge permits, and (3) develop plans to restore impaired waters. EPA tracks the progress states are making toward developing these criteria. (Based on EPA's data, Ohio is projected to be the first state with a complete set of nitrogen and phosphorus criteria, though this will not occur until 2016. Connecticut is not projected to have complete criteria until at least the end of 2020, but criteria for phosphorus in rivers and streams are expected by the end of 2017.)

Examples of Laws and Programs that Help Combat Algae Growth

National Survey of Algae Programs. A 50-state survey conducted by the National Wildlife Federation, an environmental education and advocacy organization, and Resource Media in 2014 researched state approaches to algae bloom monitoring, public awareness, and action.

Almost half of the thirty-eight states that responded reported active monitoring of some public access lakes or water bodies that had experienced algae blooms. One state, Nebraska, reported monitoring all public access lakes and water bodies. (Connecticut did not respond to the survey.)

Nearly three-quarters of the states reported informing the public in some fashion, whether on request, through a press release, on a public website, or by posting signs at impacted areas.

Twelve states reported operating a program addressing harmful algae blooms (i.e., with dedicated staff, a budget, a planning process). Three of these states (New York, Virginia, and Washington) reported that their programs have dedicated funding.

Freshwater Algae Control Program. In 2005, Washington legislatively established a Freshwater Algae Program within its Department of Ecology to give funding to groups working to manage or control algae, prioritizing projects for water bodies with toxic algae blooms in the previous three years. Funding for the programs comes from an annual $1 fee on boat owners. The program also helps with algae monitoring, including identification and toxicity testing (Wash. Rev. Code §§ 43.21A.667 and 88.02.640).

Fertilizer and Detergent Laws. A 2012 OLR Report identified 11 states with laws restricting the use of fertilizer with phosphorus. These laws vary. (Connecticut passed a similar law later that year.) And, like Connecticut, many states have laws restricting the amount of phosphorus allowed in certain detergents. As of 2010, seventeen states, including New York and Massachusetts, have stricter laws than Connecticut, also restricting phosphorus use in certain machine dishwashing detergents.

Shoreland Protection Laws. Several states, including Maine and Vermont, have laws requiring oversight of projects undertaken within a certain distance of lakes and other water bodies. One of the primary goals of these laws is to protect water quality.

Under Maine's Mandatory Shoreland Zoning Act (Me. Rev. Stat. Ann. tit. 38 §§ 445-449), municipalities must adopt, administer, and enforce local ordinances that regulate land use activity in the "Shoreland Zone" (e.g., within 250 feet of ponds and nonforested wetlands of at least 10 acres). The state has a model ordinance for municipalities to follow. It provides standards for shoreland development activities such as minimum lot area and frontage, structure setbacks, erosion and sedimentation control, and sewage disposal. Maine's Department of Environmental Protection provides a handbook to help landowners understand the law and the roles of state and municipal government in administering it.

Vermont's Shoreland Protection Act (VT. Stat. Ann. tit. 10 §§ 1441 et seq.) establishes a state regulation for guiding development within a "Protected Shoreland Area." This area is 250 feet from the mean water level of all lakes of more than 10 acres. It generally requires a permit or registration for projects occurring in this area and sets various standards for development, such as limiting impervious surface cover and cleared areas. It also requires natural vegetation within 100 feet of the mean water level to be maintained according to certain standards. Under the act, the state may delegate its authority to municipalities that adopt and implement equivalent zoning requirements.

HYPERLINKS

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